Risk-Based Corrective Action Evaluation
Plattsburgh AFB

SITE ST-031
CENTRAL HEAT PLANT

Contract No.
F41624-95-D-8003-0001

Project No.
THWA 95-6009P2

Revision 0.0

September, 1997

DEPARTMENT OF THE AIR FORCE
AIR FORCE BASE CONVERSION AGENCY

May 9, 2000

MEMORANDUM FOR NYS DEPT OF ENVIRONMENTAL CONSERVATION
ATTN: MR. ART STEMP
Office of Environmental Quality, Region V
Route 86, PO Box 296
Ray Brook NY 12977-0296

FROM: AFBCA/DA Plattsburgh
22 US Oval Suite 2200
Plattsburgh NY 12903

SUBJECT: IRP Site ST-031, Central Heat Plant

Attached for your information, review, and/or comment is the Risk Based Corrective Action Evaluation for IRP Site ST-031, Central Heat Plant (Building 2658). This evaluation was performed to assess site conditions as a result of operation of a 20,000-gallon heating fuel UST and fuel transfer area on the east side of the building. Included in the evaluation is a summary of soil and groundwater sampling conducted between 1994 and 1997. Comparison of soil and groundwater sampling results with risk-based screening levels and site specific target levels indicates no significant risk to human health.

All USTs associated with Central Heat Plant (UST-2658A and UST-2658B, and an underground holding tank associated with the aboveground oil/water separator) were removed in 1996 along with 973 tons of contaminated soil, which was disposed of off base via thermal treatment and recycling. UST closure is documented in the April 1997 Closure Report for the Removal of Underground Storage Tanks, Oil/Water Separators, Septic Tanks, and Aboveground Storage Tanks (six volumes) prepared by OHM Remediation Services Corporation and was previously provided to your office.

In addition, the Heat Plant Bulk Fuel Storage Area (ASTs-2622/2663/2664) was closed in 1997; tanks, all associated piping and approximately 628 tons of soil were removed and documented in the October 1998 Central Heat Plant Bulk Storage Area Closure Report which was provided to your office. December 1998

Based on the above information, we feel no further action is necessary at IRP Site ST-031 or the storage tanks associated with the Central Heat Plant and request your concurrence.

Our POC is Dave Farnsworth at (518) 563-2871, ext 15.

MICHAEL D. SOREL, PE
Site Manager/BRAC Environmental Coordinator

Attachment:
Risk-Based Corrective Action Evaluation

cc:
NYSDEC (Mr. James Quinn) w/o Atch

RISK-BASED CORRECTIVE ACTION EVALUATION
SITE ST-031, CENTRAL HEAT PLANT

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

APPENDIX A

APPENDIX B

The Central Heating Plant located at Plattsburgh Air Force Base, Plattsburgh, New York was evaluated using the NYSDEC's **"Interim Procedures for Inactivation of Petroleum-Impacted Sites"**. The key conclusions are:

The available data from the monitoring wells and borings indicates that there are minimal impacts to soil and groundwater at the site.

Since BTEX were generally non-detect in soil, PAHs were the only chemicals of concern. Groundwater impacts at the site appear to be localized in the vicinity of geoprobe point 04-05-B.

Since BTEX and PAHs were not detected in all monitoring wells in the recent two years, and there is no history of shallow groundwater use at Plattsburgh AFB, the shallow groundwater pathway was considered incomplete.

Site conceptual exposure model for the site indicates that complete exposure pathways exist for (i) current on-site commercial worker, (ii) potential future construction worker, and (ii) future on-site commercial worker. The representative site concentrations of BTEX and PAHs in soil and groundwater were all below Tier 1 RBSLs.

Since impacts to soil and groundwater have been low and the maximum site concentrations in soil and groundwater are below the respective Tier 1 RBSLs, it is our recommendation that the site be closed with no further action.

1.0 INTRODUCTION

The Central Heating Plant located at Plattsburgh Air Force Base, Plattsburgh, New York was evaluated in accordance with the NYSDEC's **"Interim Procedures for Inactivation of Petroleum-Impacted Sites"**.

1.1 SCOPE AND OBJECTIVES

This study involved the following tasks:

- data review and identification of the constituents of concern (COCs);
- identification of current and potential future human receptors at the site;
- identification of exposure scenarios for each receptor;
- comparison of representative site concentrations with Tier 1 risk-based screening levels (RBSLs)
- if representative site concentrations exceed Tier 1 RBSLs, development of Tier 2 site-specific target levels (SSTLs);
- conclusions and recommendations based on the Tier 1 or if applicable, the Tier 2 analysis.

This report consists of 6 sections including this introductory section.

2.1 INTRODUCTION

This chapter presents site-specific data and relevant information used for risk assessment at the Central Heating Plant, Building 2658, Plattsburgh Air Force Base, New York.

2.2 SITE DESCRIPTION

Following is a brief description of the site as shown in Figures 2-1(a) and 2-1(b):

The site is located on the southeast corner of the intersection of New York Road and Arizona Avenue in Plattsburgh, New York. The facility is currently operational.

- The site has one building (no. 2658) which is a steam generating facility.
- This facility was supplied No. 6 fuel oil stored in a day tank located adjacent to the building towards the northeast.
- The day tank (UST of 20,000 gallon capacity) was supplied by three above ground storage tanks (ASTs) of 130,000 (two) and 420,000 (one) gallon capacity located beyond New York Road, northwest of building 2658. The day tank was excavated in November 1996.
- One diesel UST located towards the southwest portion of the site was excavated in September 1996.
- A hazardous waste storage facility is located near the southeast corner of the site.
- The entire site is paved with asphalt.
- A swamp is located towards the southern end of the site.
- Towards the eastern edge of the site is a railroad track that runs parallel to Arizona Avenue. Adjacent to the tracks and running parallel to it is a swale that runs into a wetland.
- Towards the east across the railroad tracks is Heavy Equipment Maintenance Facility. Three decommissioned gasoline tanks exist on this property.

2.3 CHRONOLOGY OF EVENTS

The chronology of events at the site based on reports reviewed is outlined below. Figure 2-1(b) shows the locations of the monitoring wells at the site.

1953 The heating facility was constructed and commissioned.

1953-1994 Over the years, there have been numerous spills during oil transfer at the site. Tank cars were also cleaned on-site on a regular basis. Flow of oil and water into the swale and the wetland has been reported. Pipes connecting the day tank to the heating plant have been repaired and replaced several times in the last two decades.

1992 **Three feet of soil** removed in the area between the heating plant and the tracks. An asphalt pad and berm were constructed in the area. Soil was also removed from between the day tank and swale. No information is available about soil sampling and laboratory analysis from the excavation activity.

November 1994 **Final Informal Technical Information Report (ITIR)** was conducted to qualitatively assess the extent of contamination.

Four monitoring wells MW-031-001 through MW-031-004 were drilled to a maximum depth of 15 ft and screened between 2.5 ft and 15 ft bgs. **Two** soil samples were collected from each boring at 5 feet intervals.

Twelve surficial soil samples were collected within the first 6 inches of the surface.

Cone Penetrometer tests were conducted in **30 locations**. **One** soil sample and one groundwater sample were collected from each location.

All soil samples were analyzed for BTEX, TPH-D, Lube Oil, and PAHs.

September 1995 **Soil was excavated** in three stages from the swale area located towards the southern portion of the site.

21 cubic yards of soil was excavated and soil samples from the excavation were sampled with immunoassay kits.

23 cubic yards of soil were removed based on field screening and visual observations.

Based on the results of the analysis of the soil removed, an additional **6 cubic yards** were excavated. (refer Figure 2-1(d))

The stockpiled soils were analyzed for BTEX, MTBE, PCBs, and RCRA metals. Based on the results from the laboratory and the costs, the soil was found to be suitable for bioremediation at an off-site location.

Two monitoring wells MW-031-005 and MW-031-006 were drilled to a maximum depth of 15 ft and screened between 1.4 ft and 12.5 ft bgs. Three soil samples (one between 0-2 ft, and two between 9-11 ft) were collected and analyzed for BTEX and MTBE.

July 1996

Eight geoprobe soil borings were drilled (HPGP-2, HPGP-4, HPGP-6, HPGP-8, HPGP-10, HPGP-12, HPGP-13, HPGP-14) and both soil and groundwater samples were collected in the vicinity of the day tank and were analyzed for TPH. Samples in which TPH was detected were analyzed further for BTEX. (refer Figure 2-1(e)).

August 1996

One 20,000 gallon diesel UST (also known as day tank) containing No. 6 fuel oil and associated piping were excavated and removed from the west side of the building.

- The soils adjacent to the UST were excavated to a depth of 15 feet. Groundwater was encountered at approximately 6 ft bgs.
- The excavated soil was taken to the biocell treatment unit. The excavation pit was then backfilled with clean soil.
- Three composite soil samples (EX2658C1, EX2658C2, and EX2658C3) were collected from the north and south walls and analyzed for BTEX, MTBE, and PAHs.

September 1996 **One 1000 gallon diesel UST** and associated piping were excavated and removed from the west side of the building.

- The soils adjacent to the UST were excavated to a depth of 6 feet.
- No groundwater was encountered during tank removal activities.
- One composite soil sample was (EX2658-1K) collected from the sidewalls and bottom of the excavation and one composite sample was collected from stockpile and analyzed for BTEX, MTBE, and PAHs.

November 1996 **A test trench was excavated** in the vicinity of Building 2658. A layer of stained soil was observed at a depth of 2 feet. Two composite soil samples were collected from the side walls of the trench from above the and below groundwater (TT2658-1 and TT2658-2). A third grab sample was collected from the bottom of the trench. A sheen was observed on the surface of the groundwater. All samples were analyzed for VOCs and PAHs.

1997 Heat plant converted to natural gas.

May 1997 Density, moisture content, and total organic carbon content were measured in the native soils at the site.

May 1997 **Seven geoprobe borings** (01-05-B through -07-05-B) were advanced on-site in the vicinity of the railroad tracks extending from the building 2658 to the swale. Groundwater samples were collected and analyzed for VOCs and PAHs. (refer Figure 2-1(f))

2.4 SITE STRATIGRAPHY AND HYDROGEOLOGY

Figure 2-2 is a generalized cross-section of the soil stratigraphy at the site.

- Beneath the asphaltic paving, sand was encountered upto a depth of 25 ft bgs and a layer of silt up to a depth of 40 ft bgs.

- A layer of glacial till was encountered upto a depth of 60 ft bgs.

- Below 60 ft a layer of bedrock extends upto a maximum depth of investigation of 70 ft bgs.

- The average depth to groundwater at the site is 5 ft bgs.

- Groundwater flow direction fluctuates between east and southeast with an approximate hydraulic gradient of 0.016 ft/ft [Final Informal Technical Report, January 1995]. Based on pump test data analysis from a nearby site, the hydraulic conductivity was estimated as 5×10^{-3} cm/s. Thus the Darcy velocity is 8×10^{-5} cm/s (82.77 ft/yr). Assuming a porosity of 0.35 representative of sand, the seepage velocity of the water is 275 ft/yr.

2.5 CHEMICAL DATA

2.5.1 Chemicals in Soil

The summary of chemicals detected in soil are presented in Tables 2-1 through 2-3. The key conclusions are discussed below:

- Soil data from the November 1994 investigation presented the range of concentrations but not the specific concentrations corresponding to each sampling location. Hence this data was not used for the risk assessment.

- Soil BTEX concentrations in MW-030-005 and MW-030-006 were non-detect. However, the detection limits are not specified.

- BTEX concentrations were essentially non-detect in soil borings drilled around the day tank.

- PAHs were the only chemicals detected in samples collected from excavation of the day tank and hence are the only chemicals of concern.

2.5.2 Chemicals in Groundwater

The chemicals detected at the site and their concentrations are presented in Table 2-4 and Table 2-5. The key conclusions are discussed below:

- November 1994 data was qualitative in that it provides the range of chemical concentrations detected, not the exact values. Hence this data cannot be used for quantitative evaluation. (refer Table 2-4)

- Concentrations have been non-detect for BTEX and PAHs in all monitoring wells upto and including the latest monitoring event.

- Ethylbenzene (0.18 mg/L), xylenes (0.77 mg/L), and napthalene (0.18 mg/L) were detected along with PAHs in the groundwater sample collected from geoproe point 04-05-B in May 1997. Concentrations of BTEX and PAHs were not detected in any of the other borings and two monitoring wells that were sampled.

- Based on the above, the groundwater impacts at the site appear to be localized in the vicinity of boring 04-05-B.

2.6 LAND USE

2.6.1 Current Land Use

The site is a currently an operating heating plant. Hence the current land use is commercial/industrial.

2.6.2 Future Land Use

The site is located in a commercial area of Plattsburgh Air Force Base, and is located at the intersection of two busy streets. Commercial facilities surround the site and hence the most probable future use of the site will be commercial.

2.7 WATER USE

The following is the water use in the area:

- The base lies in the Lake Champlain Valley. Groundwater in Plattsburgh area occurs in both unconsolidated overburden deposits and consolidated bedrock. Locally water yields from wells screened in unconsolidated deposits vary from several hundred gallons per minute (gpm) to a few gpm.

3.1 SITE CONCEPTUAL EXPOSURE MODEL (SCEM) FOR CURRENT CONDITIONS

Exhibit 3-1 shows the site-specific conceptual exposure model (SCEM) for current conditions. Note that "C" denotes complete and "NC" denotes incomplete pathway.

EXHIBIT 3-1. SCEM FOR CURRENT CONDITIONS

Scenario, Receptor, and Pathways / Routes Analyzed	C or NC	Justification
Most exposed receptor: On-site Commercial Worker		
Outdoor Inhalation of Vapors from Soil	C	There is no evidence of soil impacts under the building. Vapor from soil can penetrate through cracks in the asphalt cover. Hence only outdoor exposure to vapors from soil is likely.
Outdoor Inhalation of Particulate emissions	NC	No exposed soil. The area is covered with asphalt.
Outdoor Inhalation of Vapors from Groundwater	C	The groundwater plume is not under the building. Vapor from groundwater can penetrate through cracks in the asphalt cover. Hence outdoor inhalation is likely.
Dermal Contact with Soil	NC	No exposed soil. The area has an asphalt cover.
Ingestion of Soil	NC	No exposed soil. The area has an asphalt cover.
Dermal Contact with Groundwater	NC	No drinking water well on-site and the area is supplied by the city.
Ingestion of Groundwater	NC	No drinking water well on-site and the area is supplied by the city.
The following other receptors were considered but risk were not calculated because it would be less than the on-site commercial worker:		
Off-site Commercial Worker		On-site commercial worker is closer to the impacted area than the off-site worker.
Off-site Residents		Located at a greater distance from the impacted area than the on-site commercial worker.
Visitor		Significantly shorter exposure duration and lower frequency than the on-site commercial worker.

3.2 SITE CONCEPTUAL EXPOSURE MODEL (SCEM) FOR POTENTIAL CONSTRUCTION ACTIVITY

Exhibit 3-2 shows SCEM during the construction activity period, during which the construction worker is the most exposed receptor due to (i) proximity to the source, and (ii) number of complete routes of exposure. Thus, risks and hazard indices to other potential receptors during the period of construction need not be quantified.

EXHIBIT 3-2. SCEM FOR POTENTIAL CONSTRUCTION ACTIVITY

Scenario, Receptor, and Pathways / Routes Analyzed	C or NC	Justification
Most exposed receptor: Construction Worker		
Outdoor Inhalation of Vapors from Soil	C	Vapor emission from impacted soil can penetrate through cracks in the asphalt cover.
Outdoor Inhalation of Particulate emissions	C	Soil is typically exposed during construction.
Outdoor Inhalation of Vapors from Groundwater	C	Vapor emission from impacted groundwater can penetrate through cracks in the asphalt cover.
Dermal Contact with Soil	C	Soil is typically exposed during construction.
Ingestion of Soil	C	Accidental soil ingestion is possible.
Dermal Contact with Groundwater	C	Dermal contact with groundwater is possible since the average depth to groundwater is approximately 5 ft bgs.
Ingestion of Groundwater	NC	No drinking water wells on-site

3.3 SITE CONCEPTUAL EXPOSURE MODEL (SCEM) FOR FUTURE CONDITIONS

Exhibit 3-3 shows the site-specific conceptual exposure model (SCEM) for future conditions. Note that "C" denotes complete and "NC" denotes incomplete pathway..

EXHIBIT 3-3. SCEM FOR FUTURE CONDITIONS

Scenario, Receptor, and Pathways / Routes Analyzed	C or NC	Justification
Most exposed receptor: On-site Commercial Worker		
Indoor Inhalation of Vapors from Soil	C	A building may be constructed over the impacted soil. Vapor from soil can penetrate through cracks in the asphalt cover. Hence indoor exposure to vapors from soil is likely.
Outdoor Inhalation of Particulate emissions	NC	No exposed soil. The asphalt cover is likely to remain intact in the future.
Indoor Inhalation of Vapors from Groundwater	C	The groundwater plume is not under the building. Vapor from groundwater can penetrate through cracks in the asphalt cover. Hence indoor exposure to vapors from groundwater is likely.
Dermal Contact with Soil	NC	No exposed soil. The asphalt cover is likely to remain intact.
Ingestion of Soil	NC	No exposed soil. The asphalt cover is likely to remain intact.
Dermal Contact with Groundwater	NC	No drinking water well on-site and the area is supplied by the municipality.
Ingestion of Groundwater	NC	No drinking water well on-site and the area is supplied by the municipality.
The following other receptors were considered but risk were not calculated because it would be less than the on-site commercial worker:		
Off-site Commercial Worker		On-site commercial worker is closer to the impacted area.
Off-site Residents		Located at a greater distance from the impacted area than the on-site commercial worker.
On-site Maintenance Worker		Significantly shorter exposure duration and lower frequency compared to the commercial worker.
Visitor		Significantly shorter exposure duration and lower frequency than the on-site commercial worker.

4.0
TIER 1 - RISK BASED SCREENING EVALUATION

4.1 INTRODUCTION

Tier 1 risk-based screening levels (RBSLs) are conservative corrective action goals which are based on non-site specific generic fate and transport and exposure parameters, aesthetic criteria, and other appropriate standards such as maximum contaminant levels (MCLs) for potable groundwater use. Tier 1 allows for selection of exposure scenarios based on current and future land use (e.g., residential, industrial), receptors, and institutional controls. The Tier 1 levels are calculated using very conservative assumptions, thus rendering it appropriate for a screening level analysis.

4.2 TIER 1 RISK-BASED SCREENING LEVELS

Following are the conclusions based on the comparison of the site-specific concentrations with the RBSLs presented in Table 4-1:

Commercial Worker (Current)

- Maximum site-specific concentrations of BTEX and PAHs in soil are below the Tier 1 RBSL developed based on the outdoor inhalation pathway.
- Maximum BTEX and PAHs in groundwater are below the RBSLs developed based on the outdoor inhalation pathway.

Construction worker

- Maximum site-specific concentrations of BTEX and PAHs in soil and groundwater are lower than the respective Tier 1 RBSLs developed based on the outdoor inhalation pathway.

Commercial Worker (Future)

- Maximum site-specific concentration of BTEX and PAHs in soil are below the Tier 1 RBSL developed based on the indoor inhalation pathway.
- Maximum site-specific concentration of BTEX and PAHs in groundwater are below the Tier 1 RBSL developed based on the indoor inhalation pathway. All other chemicals detected were below their respective target levels.

4.3 RECOMMENDATIONS BASED ON TIER 1 EVALUATION

Since the representative (maximum) site concentrations for soil and groundwater are below the Tier 1 RBSLs, it is recommended that the site be closed with no further action.

5.0
CONCLUSIONS

The Central Heating Plant located at Palttsburgh Air Force Base, Plattsburgh, New York was evaluated using the NYSDEC's "**Interim Procedures for Inactivation of Petroleum-Impacted Sites**". The key conclusions are:

1. The available data from the monitoring wells and borings indicates that there are minimal impacts to soil and groundwater at the site.

2. Since BTEX were generally non-detect in soil, PAHs were the only chemicals of concern. Groundwater impacts at the site appear to be localized in the vicinity of boring 04-05-B.

3. Since BTEX and PAHs were not detected in all monitoring wells in the recent two years, and there is no history of shallow groundwater at the Plattsburgh AFB, the shallow groundwater pathway was considered incomplete.

4. Site conceptual exposure model for the site indicates that the complete exposure pathways exist for (i) current on-site commercial worker, (ii) potential future construction worker, and (ii) future on-site commercial worker. The representative site concentrations of BTEX and PAHs in soil and groundwater were all below Tier 1 RBSLs.

5. Since impacts to soil and groundwater have been low and and the maximum site concentrations in soil and groundwater are below the respective Tier 1 RBSLs, it is our recommendation that the site be closed with no further action.

6.0
REFERENCES

ASTM, Designation: E-1739-95. 1995. Standard Guide for Risk-Based Corrective Action Applied at Petroleum Storage Sites.

Feenstra, S., D. M. Mackay, and J. A. Cherry. 1991. A Method of Assessing Residual NAPL Based on Organic Chemical Concentrations in Soil samples. Groundwater Monitoring Review. pp. 128-136.

Lyman, W. J., W. F. Reehl, and D. H. Rosenblatt. 1990. Handbook of Chemical Property Estimation Methods. McGraw-Hill: New York.

New York State Department of Environmental Conservation. January 1997. Interim Procedures for Inactivation of Petroleum-Impacted Sites.

U. S. Environmental Protection Agency (EPA). 1985. Rapid Assessment of Exposure to Particulate Emissions from Surface Contaminated Sites. Office of Health and Environmental Assessment. EPA/600/8-85/002.

U. S. Environmental Protection Agency (EPA). 1988. Superfund Exposure Assessment Manual. EPA/640/1-88/001.

U. S. Environmental Protection Agency (EPA). 1989(a). Exposure Factors Handbook. Office of Health and Environmental. U.S. EPA/600/8-89/043.

U. S. Environmental Protection Agency (EPA). 1989(b). Risk Assessment Guidance for Superfund, Vol. I. Human Health Evaluation Manual (Part A). EPA/540/1-89/002.

U. S. Environmental Protection Agency (EPA). 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors". OSWER Directive 9285.6-03.

U. S. Environmental Protection Agency (EPA). 1992. Dermal Exposure Assessment: Principles and Applications. Office of Health and Environmental Assessment. EPA/600/8-91/011B.

U. S. Environmental Protection Agency (EPA). 1994. Integrated Risk Information System Storage Sites(IRIS). On-line, Environmental Criteria and Assessment Office, Cincinnati, OH.

U. S. Environmental Protection Agency (EPA). 1994. National Primary Drinking Water Standards. Office of Water. EPA/810/F-94/001A.

Site Specific Documents

Malcolm Pirnie, Inc., July 1994. Preliminary Assessment for Plattsburgh Air Force Base.

Jacobs Engineering Group, Inc., January 1995. Final Informal Technical Information Report.

Jacobs Engineering Group, Inc., April 1996. Phase II Contamination Assessment and Remedial Activities.

OHM Remediation Services Corporation, August 1996. Sampling & Analysis Site Report.

OHM Remediation Services Corporation, September 1996. Groundwater Monitoring Report.

OHM Remediation Services Corporation, September 1996. UST Removal Report.

OHM Remediation Services Corporation, November 1996. UST Removal Report.

OHM Remediation Services Corporation, December 1996. Sampling & Analysis Site Report.

RECRA Labnet, June 1997. Inorganic Case Narrative.

APPENDIX A

TABLES

TABLE 2-1
SOIL SUMMARY FOR PRELIMINARY INVESTIGATION AT CENTRAL HEATING PLANT (November, 1994)

Analytical Method	Analyte	No. of Detects	Total no. of Samples	Concentrations Range
DOH 210.13	Diesel	12	44	8.1 - 54,000 mg/Kg
	Lube Oil	11	44	Detected

TABLE 2-2
ANALYTICAL DATA SUMMARY FOR VOCs AND TPH IN SOIL AT THE CENTRAL HEATING PLANT

Boring & Monitor Well	Date Sampled	Depth [ft. bgs]	Benzene [mg/kg]	Toluene [mg/kg]	Ethylbenzene [mg/kg]	Total Xylenes [mg/kg]	BTEX [mg/kg]	MTBE [mg/kg]	TPH-G [mg/kg]	TPH-D [mg/kg]	TPH-Heavy [mg/kg]
On-site Soil Samples											
MW-031-005	20-Sep-95	0-2	ND	ND	ND	ND	ND	ND	NA	NA	NA
MW-031-005	20-Sep-95	9-11	ND	ND	ND	ND	ND	ND	NA	NA	NA
MW-031-005	20-Sep-95	9-11	ND	ND	ND	ND	ND	ND	NA	NA	NA
Swale-composite*	20-Sep-97	-	ND	ND	ND	ND	ND	ND	NA	NA	NA
HPGP-2	17-Jul-96	7.5	<0.005	<0.005	<0.005	<0.005	ND	<0.04	ND	ND	56.9
HPGP-4	17-Jul-96	7.5	<0.125	<0.125	4.4	1.75	6.28	<1	136	26.1	ND
HPGP-6	17-Jul-96	7	NA	NA	NA	NA	ND	<2	ND	ND	ND
HPGP-8	17-Jul-96	6.5	NA	NA	NA	NA	ND	NA	ND	ND	ND
HPGP-10	17-Jul-96	6	0.078	0.28	3.45	1.74	5.54	<2	319	1560	ND
HPGP-12	17-Jul-96	1.5	0.001	<0.005	<0.005	<0.005	0.009	<1	ND	30.5	184
HPGP-13	17-Jul-96	2	<0.125	0.67	2.83	9.13	12.7	NA	748	5350	13700
HPGP-14	17-Jul-96	6	<0.005	<0.005	0.417	0.278	0.700	NA	350	223	57
EX2658-C1	15-Aug-96	-	<0.002	0.002	<0.002	<0.002	ND	<1	NA	NA	NA
EX2658-C2	15-Aug-96	-	0.002	0.006	<0.001	0.066	0.075	<1	NA	NA	NA
EX2658-CE	15-Aug-96	-	<0.002	<0.001	<0.001	<0.001	ND	<1	NA	NA	NA
TT2658-1	26-Nov-96	-	<0.0057	<0.0057	<0.0057	<0.0057	ND	<0.0057	NA	NA	NA
TT2658-2	26-Nov-96	-	<0.0033	<0.0033	<0.0033	4.500	4.505	<0.0033	NA	NA	NA
EX2658-1K**(NW)	23-May-96	-	0.0007	ND	ND	0.0005	0.001	12.83	NA	NA	NA
OVERALL	MEAN		0.002	0.012	0.125	0.194	0.311	0.2	388.3	1437.9	3499.5
	STANDARD DEVIATION		0.012	0.077	0.658	1.093	1.599	1.4	257.8	2278.7	6800.6
	MAXIMUM		0.078	0.674	4.400	9.130	12.697	12.8	748.0	5350.0	13700.0

* the sample was analyzed and found to contain: 2.9 mg/Kg Arsenic, 73 mg/Kg Barium, 8.3 mg/Kg Chromium, 24 mg/Kg Lead

Initial depth to water = 5 ft bgs ND = Not Detected

EX2658 Day tank removal ** from diesel tank excavation

TT2658 Trench beside 2658 NA = Not Analyzed

HP Geoprobes around day tank

TABLE 2-3
SUMMARY OF PAHs IN SOIL
AT THE CENTRAL HEATING PLANT (November 1995)

Chemical	EX2658-C1 [mg/kg]	EX2658-C2 [mg/kg]	EX2658-C3 [mg/kg]	TT2658-1 [mg/kg]	TT2658-2 [mg/kg]	EX2658-1K [mg/kg]
Naphthalene	0.145	0.209	<0.33	<0.19	0.43	<0.33
Acenaphthene	1.24	2.73	0.052	<0.19	<0.19	<0.33
Fluorene	1.63	2.55	0.0733	<0.19	<0.19	<0.33
Phenanthrene	3.94	6.29	0.772	<0.19	<0.19	<0.33
Anthracene	0.933	1.37	0.146	<0.19	<0.19	<0.33
Fluoranthene	0.914	1.18	1.171	<0.19	<0.19	<0.33
Pyrene	1.47	2.39	0.913	<0.19	<0.19	<0.33
Benzo (a) anthracene	<0.33	<0.33	0.445	<0.19	<0.19	<0.66
Chrysene	1.342	0.329	0.561	<0.19	<0.19	<0.66
Benzo (b) fluoranthene	0.478	0.634	0.725	<0.19	<0.19	<0.66
Benzo (k) fluoranthene	0.389	0.329	0.233	<0.19	<0.19	<0.66
Benzo (a) pyrene	0.848	1.069	0.544	<0.19	<0.19	<0.66
Dibenzo (a,h) anthracene	<0.33	<0.33	0.098	<0.19	<0.19	<0.66
Benzo (g,h,i) perylene	<0.33	<0.33	0.372	<0.19	<0.19	<0.66
Indeno (1,2,3-cd) pyrene	<0.33	<0.33	0.405	<0.19	<0.19	<0.66

[ ] non-detect

TABLE 2-4
GROUNDWATER SUMMARY FOR PRELIMINARY INVESTIGATION AT CENTRAL HEATING PLANT (November, 1994)

Analytical Method	Analyte	No. of Detects	Total no. of Samples	Concentrations Range
DOH 210.13	Diesel	27	38	0.47 mg/L - 1.7 mg/L
	Lube Oil	18	38	Detected
SW 6010	Lead	1	1	24 ppb

TABLE 2-5
SUMMARY OF CHEMICALS IN GROUNDWATER
AT THE CENTRAL HEATING PLANT

Chemicals	MW-030-001 [mg/L]		MW-030-002 [mg/L]			MW-030-003 [mg/L]			MW-030-004 [mg/L]		MW-030-005 [mg/L]	MW-030-006 [mg/L]
Method 8021	**Sep-95**	**Sep-96**	**Sep-95**	**Sep-96**	**May-97**	**Sep-95**	**Sep-96**	**May-97**	**Sep-95**	**Sep-96**	**Sep-95**	**Sep-95**
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylebenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Method 8270												
Phenol	0.0021	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3/4-methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-methylnapthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (a) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylexyl)pthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND non-detect Chemicals Detected

TABLE 2-5 (concluded)
SUMMARY OF CHEMICALS IN GROUNDWATER*
AT THE CENTRAL HEATING PLANT

Chemicals	01-05-B [mg/L]	02-05-B [mg/L]	03-05-B [mg/L]	04-05-B [mg/L]	05-05-B [mg/L]	06-05-B [mg/L]	07-05-B [mg/L]
Method 8021	**May-97**	**Sep-96**	**May-97**	**May-97**	**May-97**	**May-97**	**May-97**
Benzene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	**0.18**	ND	ND	ND
Total Xylenes	ND	ND	ND	**0.77**	ND	ND	ND
MTBE	ND	ND	ND	ND	ND	ND	ND
Isopropylebenzene	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	**0.11**	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	**0.25**	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	**0.067**	ND	ND	ND
Naphthalene	ND	ND	ND	**0.18**	ND	ND	ND
Tetrachloroethylene	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND
Method 8270	ND	ND	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND	ND	ND
2-methylphenol	ND	ND	ND	ND	ND	ND	ND
3/4-methylphenol	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND	ND
2-methylnapthalene	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND
Benzo (a) anthracene	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND
Benzo (b) fluoranthene	ND	ND	ND	ND	ND	ND	ND
Benzo (k) fluoranthene	ND	ND	ND	ND	ND	ND	ND
Benzo (a) pyrene	ND	ND	ND	ND	ND	ND	ND
Dibenzo (a,h) anthracene	ND	ND	ND	ND	ND	ND	ND
Benzo (g,h,i) perylene	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-cd) pyrene	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylexyl)pthalate	ND	ND	ND	ND	ND	ND	ND

Chemicals Detected

* Sampled from Geoprobe borings drilled in May 1997 (refer Figure 1-1(e))

TABLE 4-1
SUMMARY OF TIER 1 RISK-BASED SCREENING LEVELS FOR SOIL AND GROUNDWATER
CENTRAL HEATING PLANT

Receptor	Media-Pathway	Agency	Benzene	Toluene	Ethylbenzene	Total Xylenes	Napthalene	Pyrene	Benzo (a) anthracene	Chrysene	Benzo (b) fluoranthene
Commercial Worker (Current)	Soil-Outdoor Inhalation [mg/kg]	NYSDEC	0.273	767	1400	5010	120	9.54E+07	1.26E+10	2.11E+09	6.37E+08
		Site-specific Max	0.078	0.7	9.3	9.13	0.209	2.39	0.445	1.34	0.725
	Groundwater-Outdoor Inhalation [mg/L]	NYSDEC	18.2	2.09E+04	5.33E+04	1.10E+05	1500	1.50E+06	5.39E+06	6.26E+06	7.05E+05
		Site-specific Max	ND	ND	0.18	0.8	0.18	ND	ND	ND	ND
Construction Worker	Soil-Outdoor Inhalation [mg/kg]	NYSDEC	12	1920	3500	1.25E+04	300	2.38E+08	3.14E+10	5.28E+09	1.59E+09
		Site-specific Max	0.078	0.7	9.3	9.13	0.209	2.39	0.445	1.34	0.725
	Groundwater-Outdoor Inhalation [mg/L]	NYSDEC	802	5.22E+04	1.33E+05	2.75E+05	3750	3.74E+06	1.35E+07	1.57E+07	1.76E+06
		Site-specific Max	ND	ND	0.18	0.8	0.18	ND	ND	ND	ND
Commercial Worker (Future)	Soil-Indoor Inhalation [mg/kg]	NYSDEC	0.158	180	474	795	4.91	3.51E+06	4.63E+08	7.77E+07	2.34E+07
		Site-specific Max	0.078	0.7	9.3	9.13	0.209	2.39	0.445	1.34	0.725
	Groundwater-Indoor Inhalation [mg/L]	NYSDEC	0.073	81.8	203	440	9.21	2.07E+04	7.52E+04	8.74E+04	9.62E+03
		Site-specific Max	ND	ND	0.18	0.8	0.18	ND	ND	ND	ND

( ) indicates value exceeds target level
ND Not Detected

TABLE 4-1(concluded)
SUMMARY OF TIER 1 RISK-BASED SCREENING LEVELS FOR SOIL AND GROUNDWATER
CENTRAL HEATING PLANT

Receptor	Media-Pathway	Agency	Benzo (k) fluoranthene	Benzo (a) pyrene	Acenapthene	Flourene	Phenanthrene	1,2,4-Tri-methylbenzene	Anthracene	1,3,5-Trimethyl-benzene
Commercial Worker (Current)	Soil-Outdoor Inhalation [mg/kg]	NYSDEC	2.01E+08	1.15E+06	1.12E+06	1.43E+06	1.07E+06	76	1.67E+06	22.5
		Site-specific Max	0.389	1.068	2.73	2.55	6.29	ND	1.37	ND
	Groundwater-Outdoor Inhalation [mg/L]	NYSDEC	2.37E+05	1.74E+03	1.73E+05	1.36E+05	5.99E+04	118	1.95E+05	116
		Site-specific Max	ND	ND	ND	ND	ND	0.25	ND	0.11
Construction Worker	Soil-Outdoor Inhalation [mg/kg]	NYSDEC	5.03E+08	7.16E+07	2.79E+06	3.57E+06	2.67E+06	190	4.17E+06	56.3
		Site-specific Max	0.389	1.068	2.73	2.55	6.29	ND	1.37	ND
	Groundwater-Outdoor Inhalation [mg/L]	NYSDEC	5.93E+05	1.09E+05	4.32E+05	3.39E+05	1.50E+05	294	4.89E+05	291
		Site-specific Max	ND	ND	ND	ND	ND	0.25	ND	0.11
Commercial Worker (Future)	Soil-Indoor Inhalation mg/kg	NYSDEC	7.41E+06	4.24E+04	4.11E+04	5.25E+04	3.93E+04	2.8	6.14E+04	0.82
		Site-specific Max	0.389	1.068	2.73	2.55	6.29	ND	1.37	ND
	Groundwater-Indoor Inhalation [mg/L]	NYSDEC	3.07E+03	24.4	2.07E+03	1.67E+03	6.59E+02	0.472	1.26E+03	0.49
		Site-specific Max	ND	ND	ND	ND	ND	0.25	ND	0.11

( ) indicates value exceeds target level
ND Not Detected

APPENDIX B

FIGURES

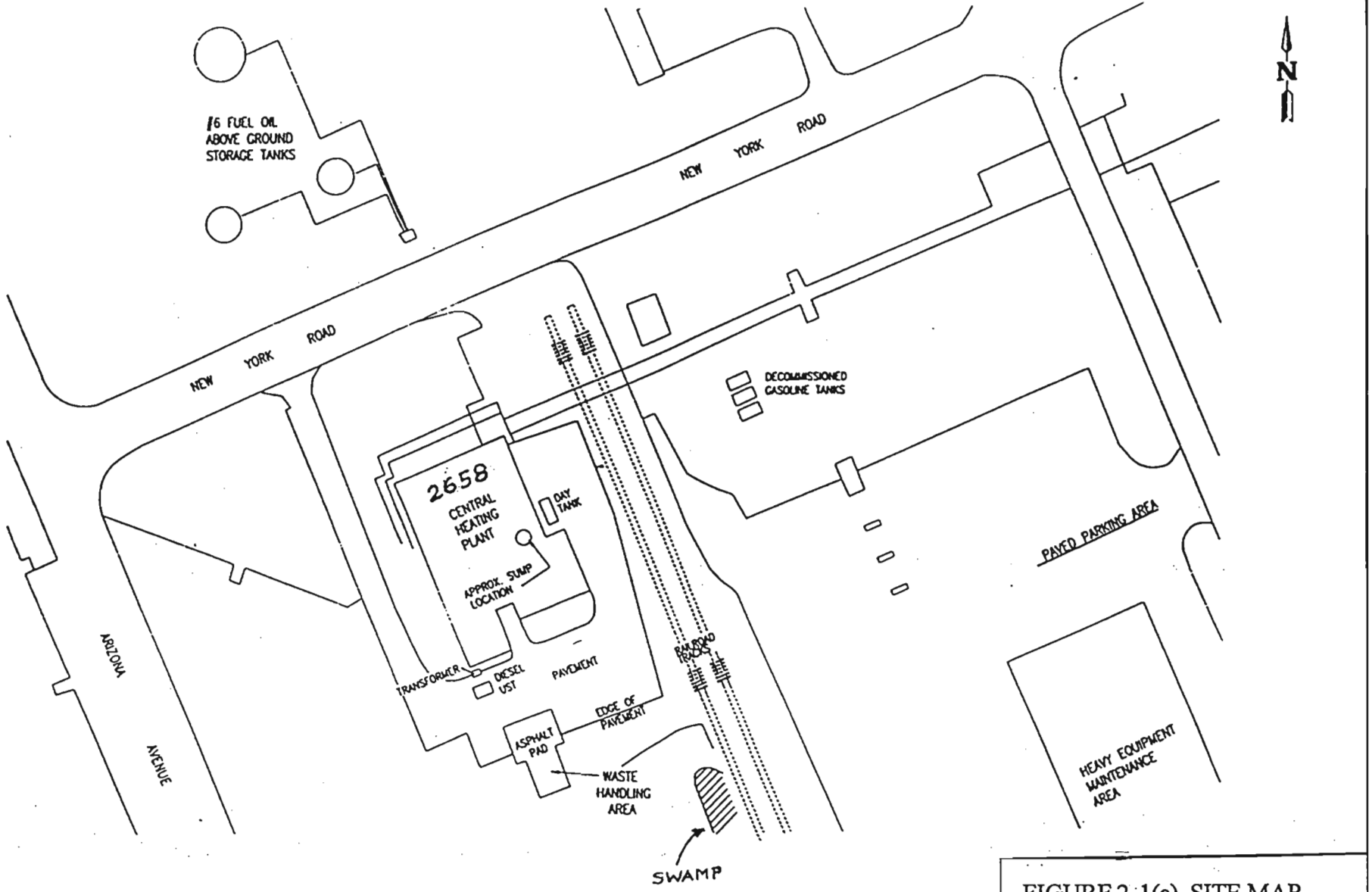

FIGURE 2-1(a) SITE MAP
Central Heating Plant

Base: Plattsburgh Air Force Base Plattsburgh, New York	Jacobs Project Number:
Drawn By: L. Robertson Date: 09/09/98	Drawing File Name: CHPSITE.DWG

JACOBS ENGINEERING GROUP INC.
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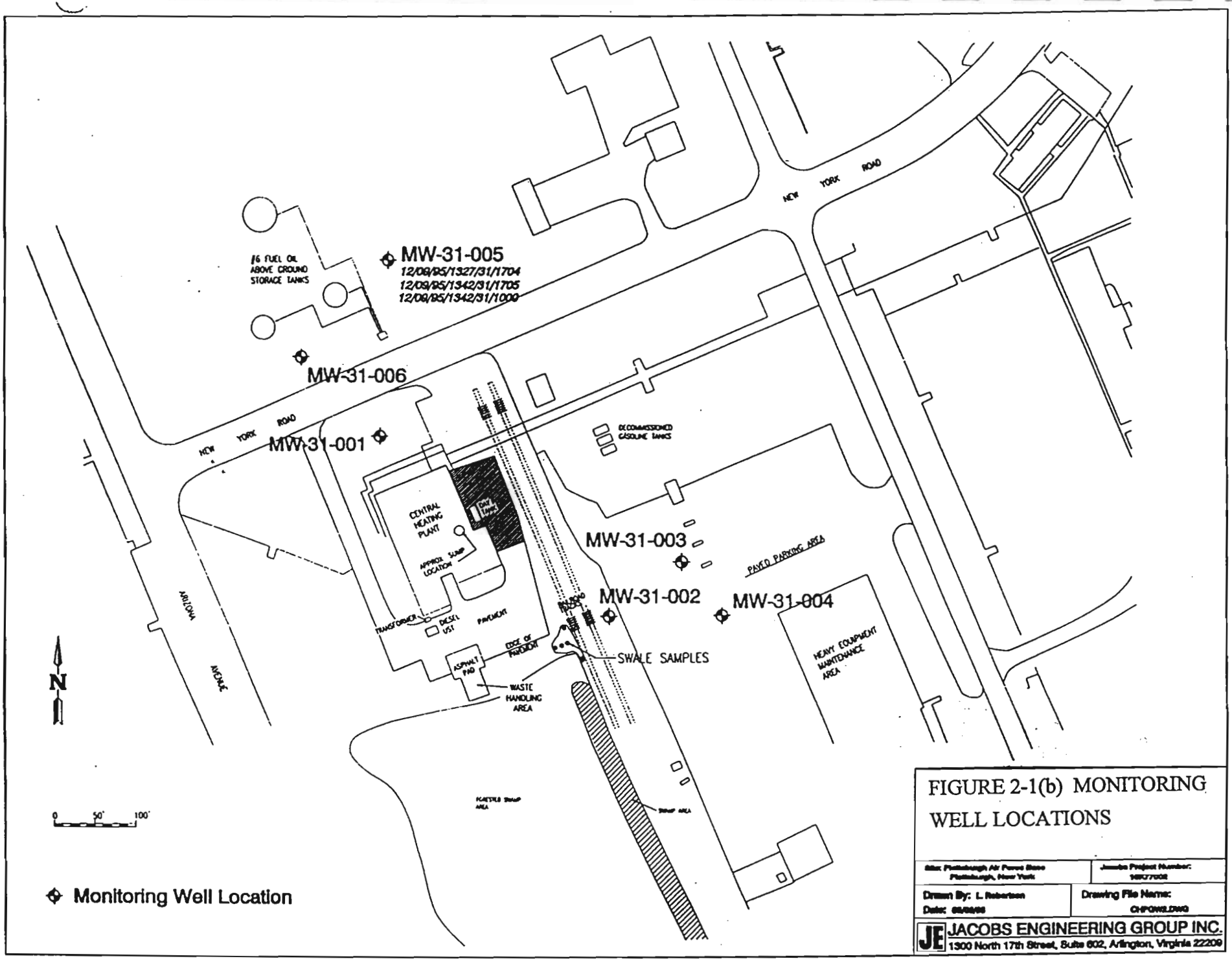

FIGURE 2-1(b) MONITORING WELL LOCATIONS

Site: Plattsburgh Air Force Base, Plattsburgh, New York	Jacobs Project Number: 19577008
Drawn By: L. Robertson Date: 05/08/96	Drawing File Name: CHPOWS.DWG

JACOBS ENGINEERING GROUP INC.
1300 North 17th Street, Suite 602, Arlington, Virginia 22209

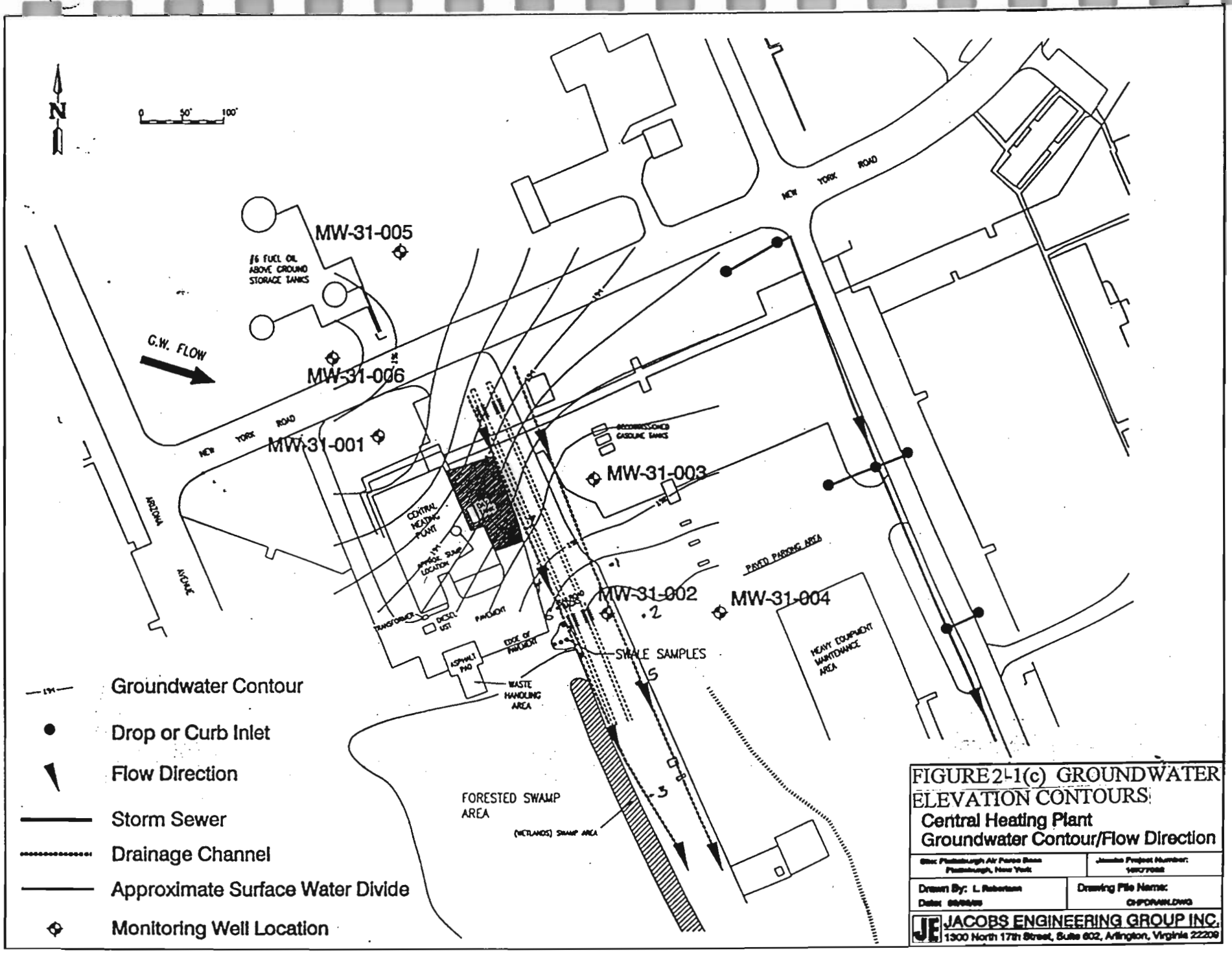

FIGURE 2-1(c) GROUNDWATER ELEVATION CONTOURS
Central Heating Plant
Groundwater Contour/Flow Direction

Site: Plattsburgh Air Force Base, Plattsburgh, New York | Jacobs Project Number: 19577888

Drawn By: L. Robertson | Drawing File Name: CHPGWKLDWG

Date: 09/09/05

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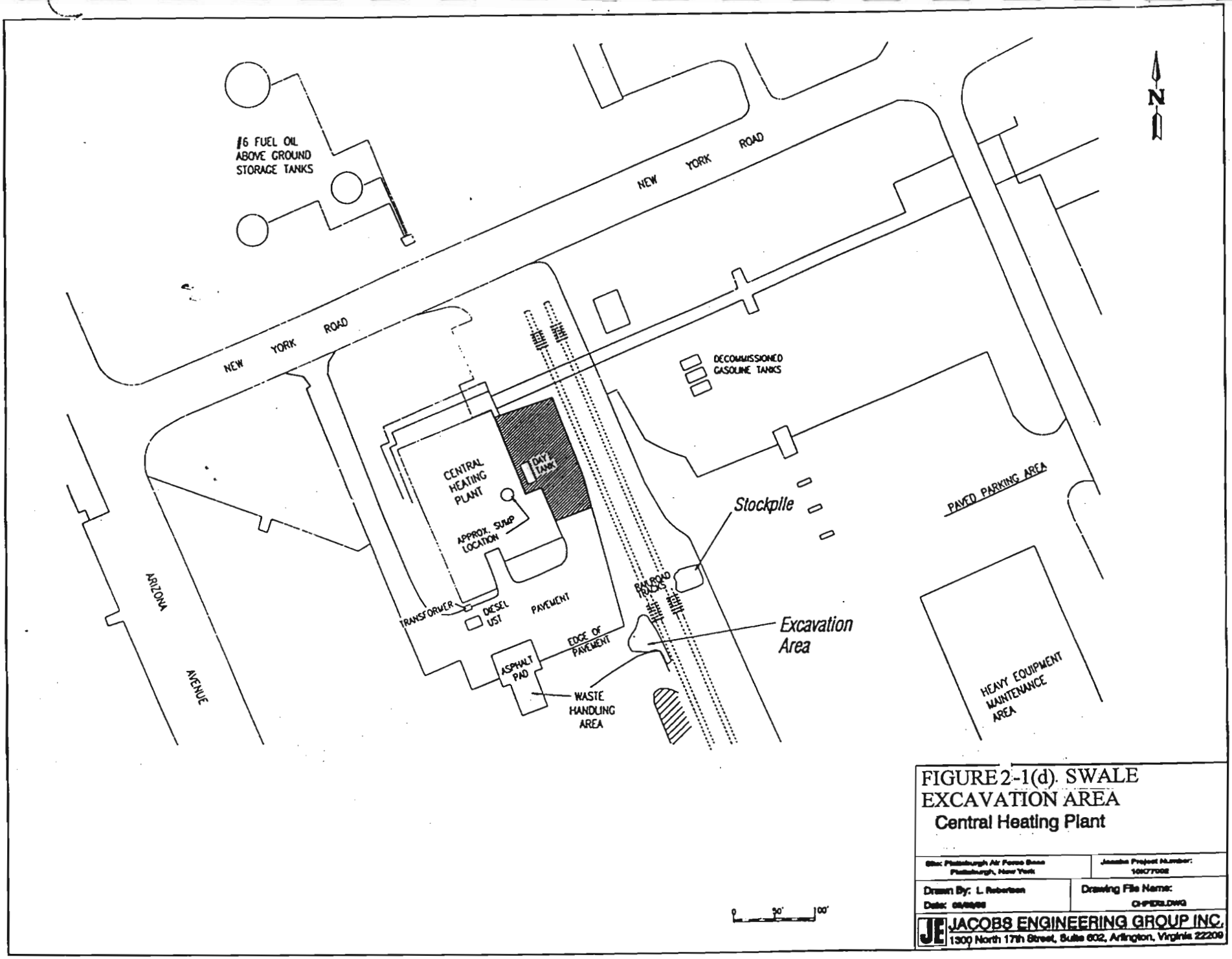

FIGURE 2-1(d). SWALE EXCAVATION AREA
Central Heating Plant

Site: Plattsburgh Air Force Base, Plattsburgh, New York	Jacobs Project Number: 14977002
Drawn By: L. Robertson Date: 08/09/06	Drawing File Name: CHPEXLDWG

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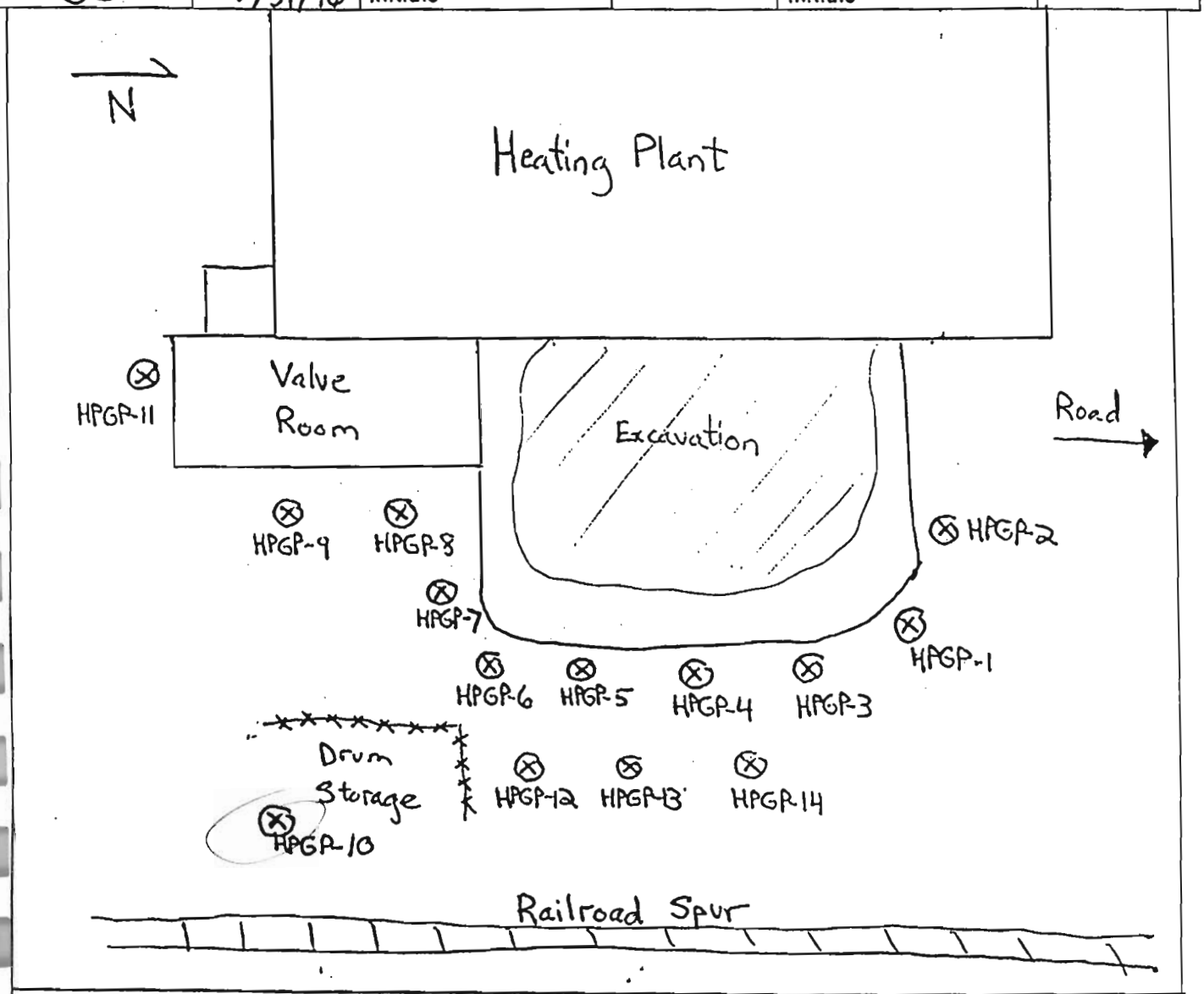
OHM Remediation Services Corp.

COMPUTATION SHEET

Form No. 0048
Midwest Tech. Servs.
Rev. 08/89

Page _____ of _____

No. 7499	Client AFCEE	Location Bldg 2658 - Cent. Heating	Subject Geoprobe Sampling
Preparer's Initials GG	Date 7/31/96	Reviewer's Initials	Date
Approver's Initials	Date		



Comments:

⊗ Geoprobe location

//// - indicates water in the excavation.

soil and water samples were collected at each location.

FIGURE 2-1(e) SOIL BORING LOCATIONS

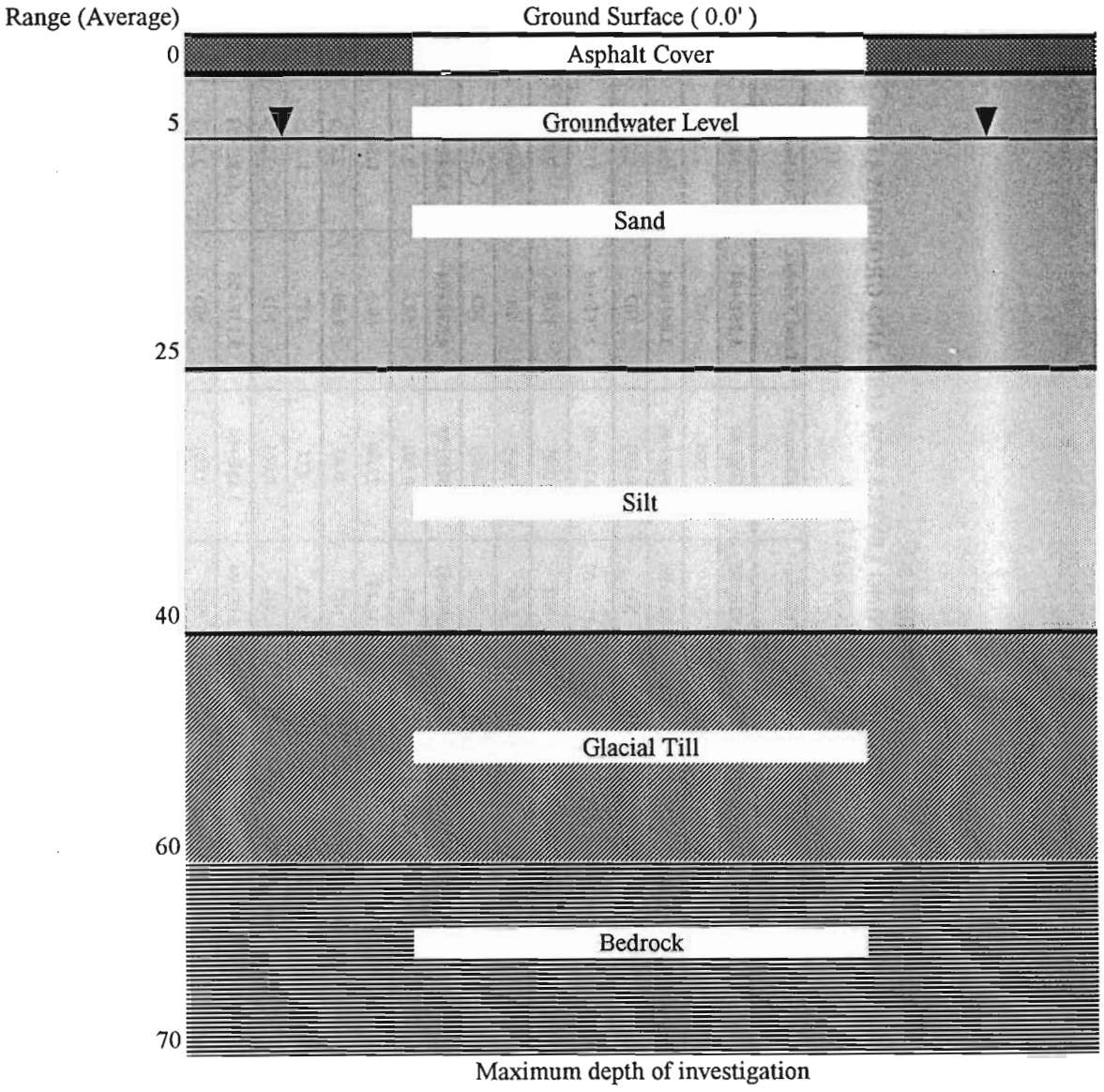


FIGURE 2-2. GENERALIZED SOIL PROFILE AT THE CENTRAL HEATING PLANT